(12) UK Patent Application (19) GB (11) 2 267 338 (13) A

(43) Date of A publication 01.12.1993

(21) Application No 9210868.7

(22) Date of filing 21.05.1992

(71) Applicant
Pen-Yen Chang
No 11 Lane 40, Chu Kuang Rd, Pan Chiao City,
Taipei Hsien, Taiwan

(72) Inventor
Pen-Yen Chang

(74) Agent and/or Address for Service
Langner Parry
High Holborn House, 52-54 High Holborn, London,
WC1V 6RR, United Kingdom

(51) INT CL[5]
F24F 5/00, F25B 21/02

(52) UK CL (Edition L)
F4V VFAB VG241 VG244 VG245 V302 V305 V307

(56) Documents cited
GB 2241378 A EP 0423076 A EP 0342166 A
US 4955203 A US 4472945 A US 4463569 A

(58) Field of search
UK CL (Edition K) F4V VFAB VFC VGBW, H1K KTQ
INT CL[5] F24F 5/00, F25B 21/02
Online databases WPI, CLAIMS

(54) Thermoelectric air conditioning

(57) A cooler fan comprising a semiconductor Peltier effect thermoelectric cooler 1 fastened in a hole on a partition wall 40 inside a housing 4 with a heat absorbing interface 10 thereof disposed in a cold air chamber 41 and a heat releasing interface 11 thereof disposed in a hot air chamber 41' a heat absorbing fin assembly 2 fastened in the cold air chamber and connected to the heat absorbing interface, a heat releasing fin assembly 3 fastened in the hot air chamber, a first fan means 5 to draw a current of air through the cold air chamber for cooling a closed outside space, a second fan 5' means to draw a current of air in cooling the hot air chamber. Gaps are sealed by asphalt thermal insulation. Filters 45 are provided.

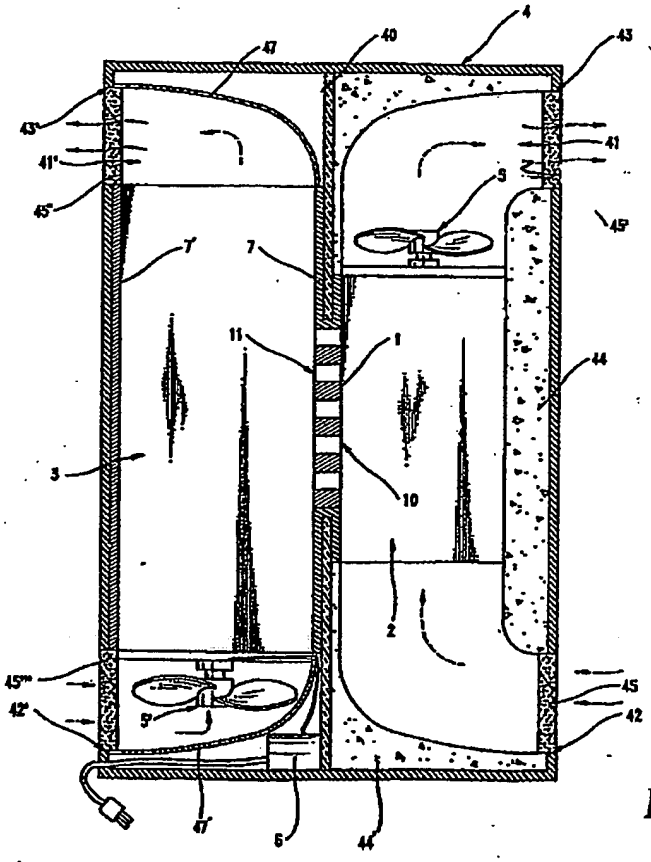

Fig.4

GB 2 267 338 A

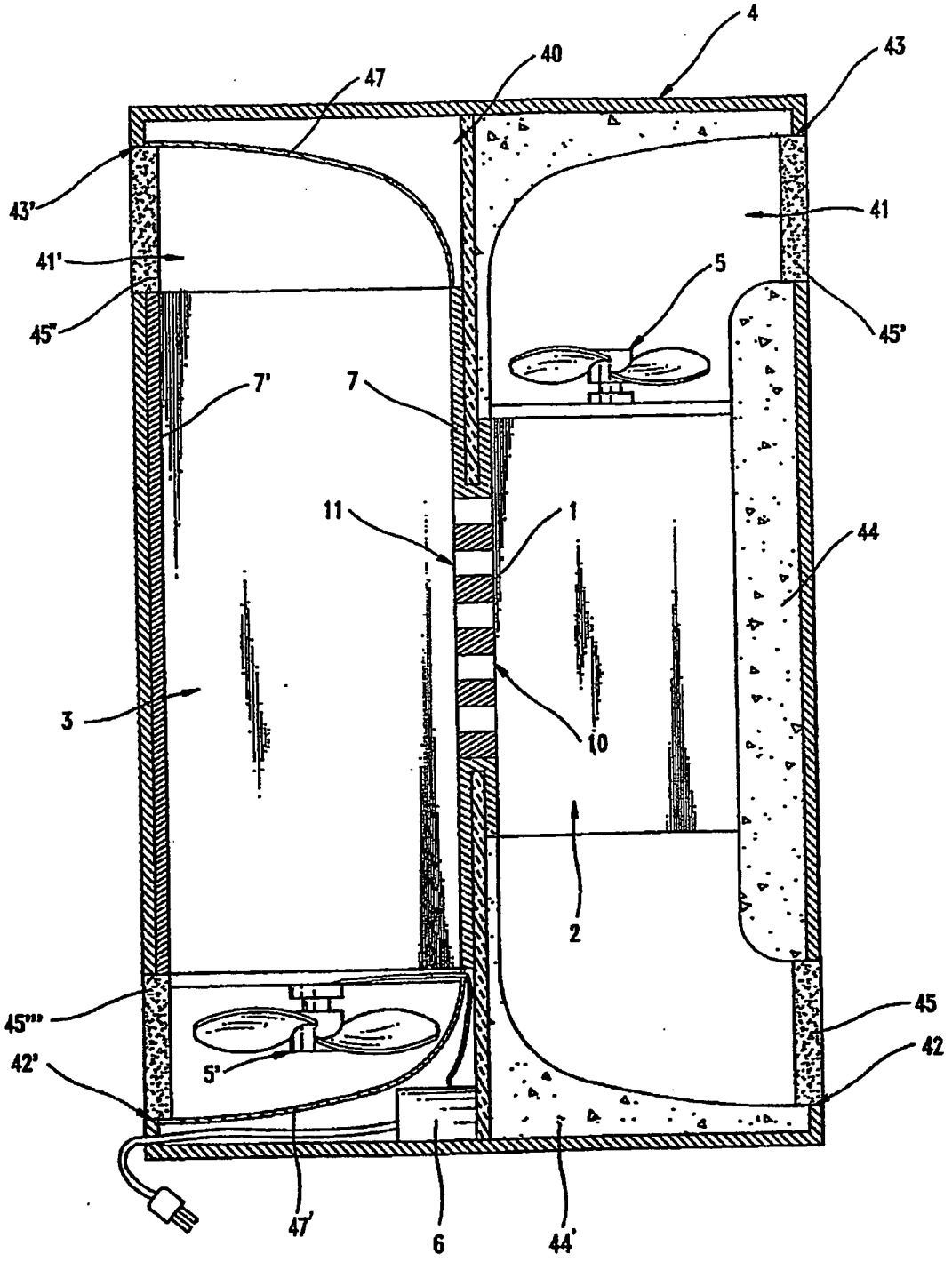

Fig. 1

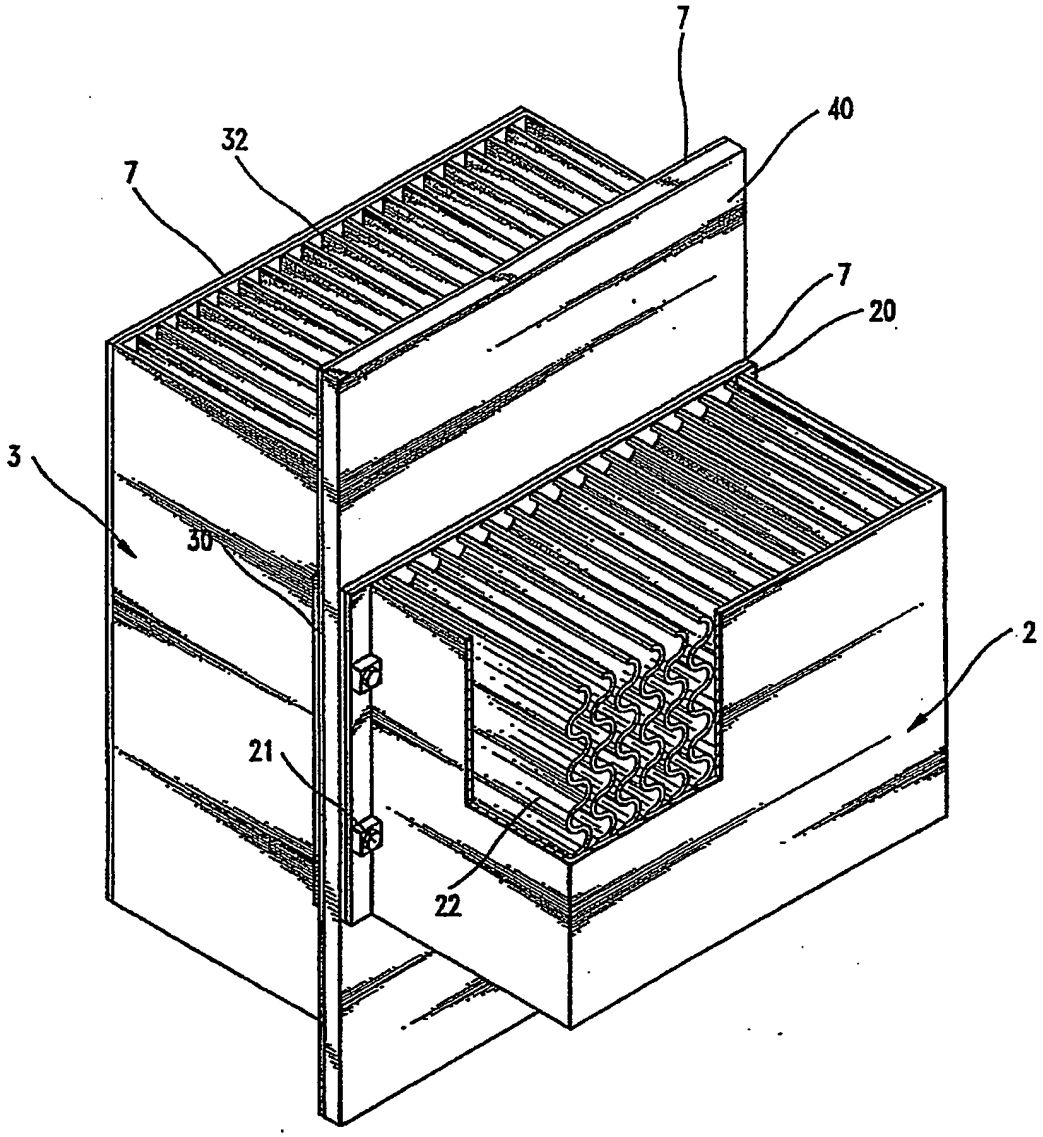

Fig.2

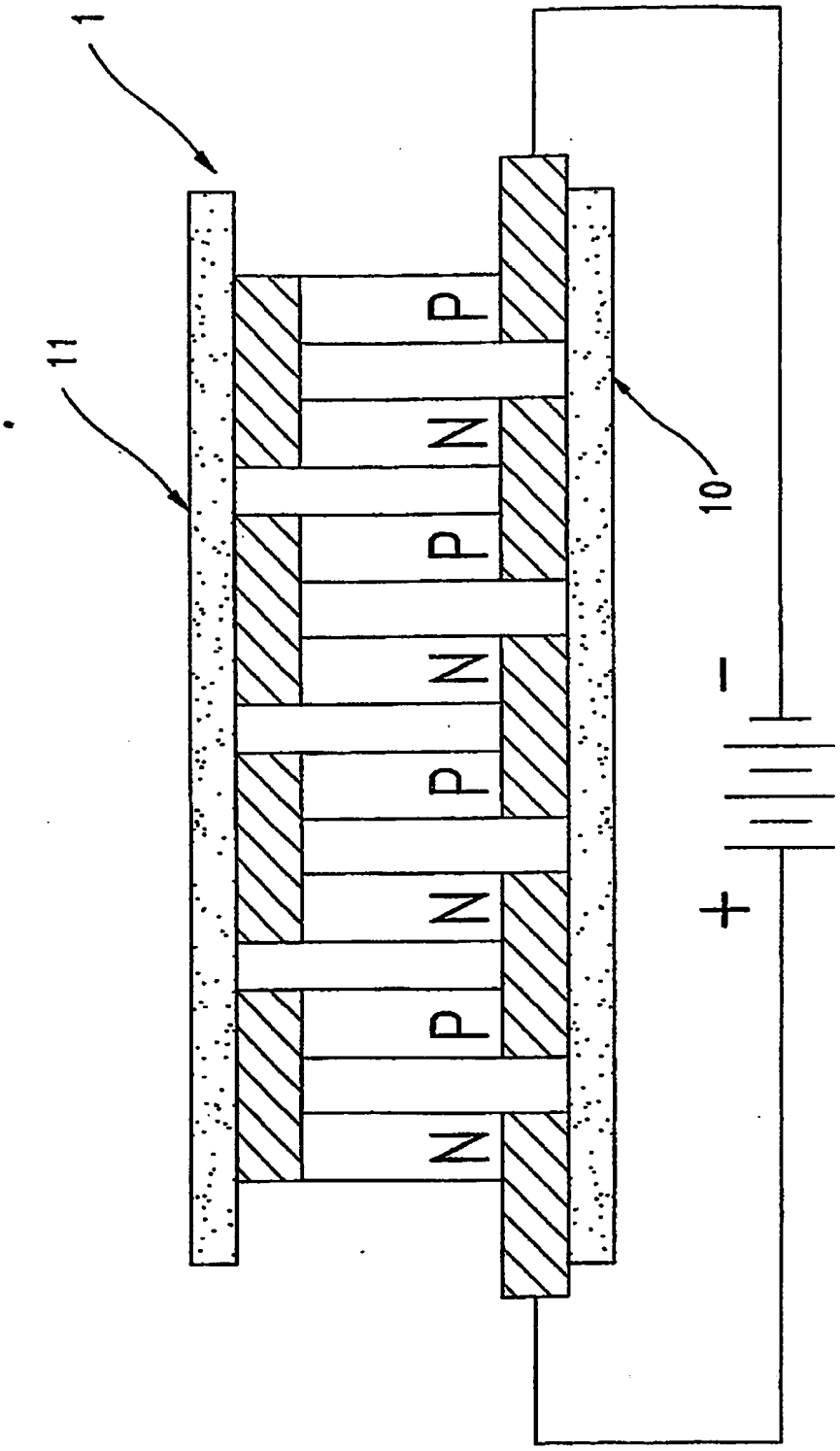

Fig.3

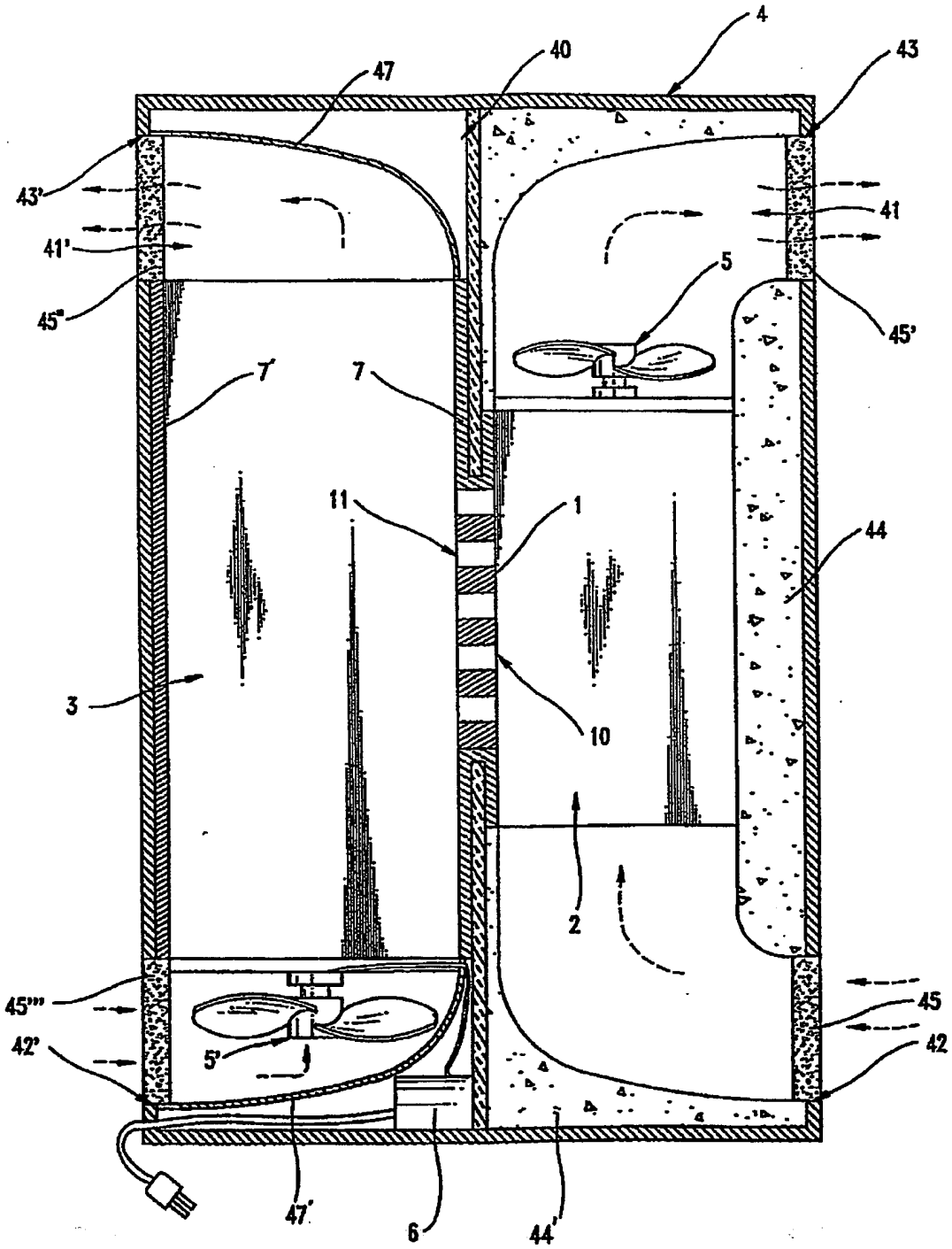

Fig.4

2267338

COOLER FAN

The present invention relates to a cooler fan which uses a semiconductor cooler to provide a cool current of air.

In hot days, electric fans and air conditioners are commonly used for cooling. However, an electric fan gives little help in cooling people when air temperature is very high. Although air conditioners are practical in function, they are commonly expensive. When in operation, an air conditioner consumes much electric power supply and produces high noises. In recent years, there is known a cooler fan which produces a current of air blowing through a water container which contains cold water. When a current of air passes through the surface of the cold water in the water container, it is simultaneously cooled down by the cold water. However, this structure cooler fan is not satisfactory in use because the water contained in the water container may be warmed up to ambient temperature quickly.

The present invention has been accomplished under

the aforesaid circumstances. It is therefore an object of the present invention to provide a cooler fan which is practical in use. It is another object of the present invention to provide a cooler fan which produces less noise and does not causes environmental pollution problem. It is still another object of the present invention to provide a cooler fan which is compact and light.

To achieve the above objects, a semiconductor cooler is used for transferring heat from one current of air to another without allowing them to mix. Two metal fin assemblies are respectively connected to the two opposite interfaces of the semiconductor cooler to accelerate the process of heat exchanging. Two electric fans are used to draw currents of air through the metal fin assemblies respectively. A transformer is provided to convert AC power supply into a 12V DC power supply for operating the electric fans and the semicorductor cooler.

An embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 is a sectional side view showing the

internal arrangement of the preferred embodiment of the cooler fan of the present invention;

Fig. 2 is an elevational view of the partition wall, the heat absorbing fin assembly and the heat releasing fin assembly;

Fig. 3 is a cross section of the semiconductor cooler; and

Fig. 4 is a cross section of the preferred embodiment of the cooler fan of the present invention showing that flows of air are drawn to pass through the heat absorbing fin assembly and the heat releasing fin assembly respectively.

Referring to the various drawings attached herewith, a detailed description of the structural features of "Cooler Fan" of the present invention is as follows:-

Referring to Fig. 1, the preferred embodiment of the present invention is generally comprised of a housing 4 divided into a cold air chamber 41 and a hot air chamber 41' by a partition wall 40. The partition wall 40 is preferably made of bakelite having a square hole (not shown) at the center. which receives a semiconductor cooler 1.

The semiconductor cooler 1, as shown in Fig. 3, is consisted of a plurality of n-type semiconductors and a plurality of p-type semiconductors alternatively connected together. When electrically connected, a phenomenon of temperature difference occurs in each semiconductor p-n junction, causing one interface (heat absorbing interface) 10 thereof to absorb heat and the other interface (heat releasing interface)11 thereof to release heat. This heat exchanging concept was disclosed in 1834 and employed for practical use in 1900. When installed, the two opposite interfaces 10,11 are disposed in the cold and hot chambers 41,41' respectively.

Referring to Fig. 2 and seeing Fig. 1 again, there is a heat absorbing fin assembly 2 and a heat releasing fin assembly 3 fastened in the cold air chamber 41 and the hot air chamber 41' respectively. The heat absorbing and releasing fin assemblies 2,3, which are fastened to the partition wall 40 at two opposite sides by screw bolts 21, have each at least one heat conductive contact wall 20 or 30 closely connected to the heat absorbing interface 10 or heat releasing interface 11 of the semiconductor cooler 1. The thickness of the partition wall 40 is thinner than the semiconductor cooler 1, and therefore the heat absorbing and

releasing interfaces 10.11 of the semiconductor cooler 1 project out of the two opposite large faces of the partition wall 40 and closely contact the heat conductive contact walls 20,30 of the heat absorbing and releasing fin assemblies 2.3 respectively. As indicated, the heat absorbing and releasing interfaces 10.11 of the semiconductor 1 are extended out of the two opposite large faces of the partition wall 40 and connected to the heat conductive contact walls 20.30 of the heat absorbing and releasing fin assemblies 2.3 respectively, gaps (not shown) are maintained between the partition wall 40 and the heat absorbing and releasing interfaces 10.11. These gaps are sealed with heat insulating materials (for example, asphalt) 7,7'. By means of the arrangement of the heat insulating materials 7,7', heat in the hot air chamber 41' is prohibited from transmitting to the cold air chamber 41.

Referring to Fig. 2 again, the heat absorbing fin assembly 2 is comprised of a plurality of corrugated metal fins 22 welded together and vertically arranged in parallel with one another. These corrugated metal fins 22 greatly increases the total surface area of the heat absorbing fin assembly 2 and the retarding time of the flow of air passing

therethrough for making heat exchange. The heat releasing fin assembly 3 is comprised of a plurality of flat metal fins 32 welded together and vertically arranged in parallel with one another. These flat metal fins 32 permit heat to be quickly carried away. In order to let heat to be transferred from the heat absorbing fin assembly 2 to the heat releasing fin assembly 3 and carried away from the heat releasing fin assembly 3 by a current of air efficiently, the size of the corrugated metal fins 22 is relatively smaller than the flat metal fins 32. Furthermore, the corrugated and flat metal fins 22,32 made be made of an aluminum alloy, so that the total weight of the cooler fan can be greatly reduced without affecting the performance of heat exchanging process.

Referring to Fig. 4 and seeing Fig. 1 again, a first electric fan 5 is fastened inside the cold air chamber 41 above the heat absorbing fin assembly 2 and controlled to draw a cold draft of air from an air intake port 42 into the cold air chamber 41 permitting it to be delivered out of the housing 4 through an outlet port 43. A second electric fan 5' is fastened inside the hot air chamber 41' below the heat releasing fin assembly 3 and controlled to draw a

economic in power consumption. Because no compressor has been used in the cooler fan, the problem of noisy operation is eliminated.

CLAIMS:

1. A cooler fan comprising a semiconductor cooler fastened in a hole on a partition wall inside a housing with a heat absorbing interface thereof disposed in a cold air chamber and a heat releasing interface thereof disposed in a hot air chamber, a heat absorbing fin assembly fastened in the cold air chamber and connected to the heat absorbing interface, a heat releasing fin assembly fastened in the hot air chamber, a fist fan means to draw a current of air through the cold air chamber for cooling a closed outside space, a second fan means to draw a current of air in cooling the hot air chamber.

2. The cooler fan according to claim 1. wherein said first and second air intake ports and said first and second air outlet ports are each covered with a wire gauze filter.

3. The cooler fan according to claim 1. wherein said semiconductor cooler is separated from said partition wall by a heat insulating material.

4. The cooler fan according to claim 1, wherein each heat conductive contact wall of said heat absorbing fin assembly or said heat releasing fin assembly is isolated from said partition wall by a heat insulating material.

5. The cooler fan according to claim 4. wherein said heat insulating material is covered over the outside surface of said partition wall.

6. The cooler fan according to claim 3 or 4. wherein said heat insulating material is asphalt.

7. The cooler fan according to claim 1. wherein the total surface area of the metal fins of said heat releasing fin assembly is larger than the total surface area of the metal fins of said heat absorbing fin assembly.

8. The cooler fan according to claim 1. wherein said metal fins are respectively made from an aluminum alloy.

9. The cooler fan according to claim 1. wherein said power supply means is to provide a 12V DC power supply.

10. A cooler fan comprising:

a housing, said housing comprising a hot air chamber and a cold air chamber divided by a partition wall, a first air intake port and a first air outlet port for guiding outside air through said cold air chamber, second air intake port and a second air outlet port for guiding outside air through said hot air chamber, said partition wall having a square opening through the center;

a semiconductor cooler fastened in said square opening, said semiconductor cooler having a heat absorbing interface disposed in said cold air chamber and a heat releasing interface disposed in said hot air chamber;

a heat absorbing fin assembly mounted on said partition wall and disposed inside said cold chamber, said heat absorbing fin assembly comprising at least one heat conductive contact wall respectively connected to said heat absorbing interface of said semiconductor cooler, and a plurality of parallel metal fins welded together and disposed in vertical direction;

a heat releasing fin assembly mounted on said partition wall and disposed inside said hot chamber, said

heat releasing fin assembly comprising at least one heat conductive wall respectively connected to said heat releasing interface of said semiconductor cooler. and a plurality of parallel metal fins welded together and disposed in vertical direction;

a first fan means fastened inside said cold chamber above said heat absorbing fin assembly. said first fan means being to draw a current of air from said first air intake port toward said first air outlet port through said heat absorbing fin assembly;

a second fan means fastened inside said hot chamber below said heat releasing fin assembly, said second fan means being to draw a current of air from said second air intake port toward said second air outlet port through said heat releasing fin assembly; and

a power supply means to provide said first and second fan means with the necessary working voltage.

11. A cooler fan substantially as hereinbefore described with reference to. and as illustrated in, the accompanying drawings.

13

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number
9210868.7

Relevant Technical fields

(i) UK Cl (Edition K) F4V; VFAB,VFC,VGBW H1K; KTQ

(ii) Int CL (Edition 5) F24F 5/00; F25B 21/02

Search Examiner
R W BALDOCK

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI, CLAIMS

Date of Search
16 JULY 1992

Documents considered relevant following a search in respect of claims 1-11

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2241378 A (FORSYTH) see especially pages 1 and 2	1-4,9
X	EP 0423076 A (GALVAN) see especially column 2 line 21 - column 4 line 18	1-5,8,9
X	EP 0342166 A (URBANO) see especially column 3 lines 4-35, column 1 lines 1-11	1-4,8,9
X	US 4955203 (SUNDHAR) see especially column 3 line 33 - column 4 line 12	1-4,8,9
X	US 4472945 (CECH) see especially column 1 line 56 - column 3 line 34	1-3,8
	US 4463569 (MCLARTY) see especially column 1 lines 36-46, column 2 lines 14-42 Figure 3	1,2,9

GEM - doc99\fil000030

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

Published 1993 at The Patent Office, Concept House, Cardiff Road, Newport, Gwent NP9 1RH. Further copies may be obtained from Sales Branch, Unit 6, Nine Mile Point, Cwmfelinfach, Cross Keys, Newport, NP1 7HZ. Printed by Multiplex techniques ltd, St Mary Cray, Kent.